AUTOMOTIVE: SUSPENSION AND STEERING

COURSE DESCRIPTION

Automotive: Suspension and Steering is a course that prepares students for entry-level positions or advanced training in automotive suspension and steering systems. Course material covers the principles of automotive suspension/steering systems and four-wheel suspension alignment. Course content provides the student the opportunity to acquire marketable skills by training in wheel alignment and the testing, diagnosis, and repair of steering and suspension systems. Lab facilities and experiences simulate automotive service industry operations through the use of training aids and modules and school-based learning opportunities.

Course content prepares students for the Automotive Service Excellence (ASE) Suspension and Steering test.

Recommended: Transportation Core

Requirement: A minimum of 100 hours must be dedicated to suspension and steering to meet minimum standards by NATEF.

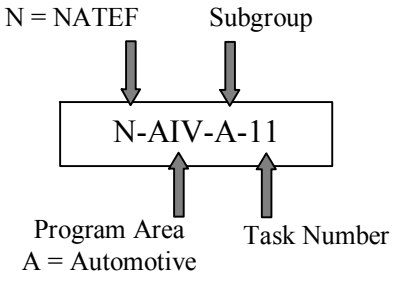
Recommended Credits: **1 or 2 (NATEF certified programs only)**

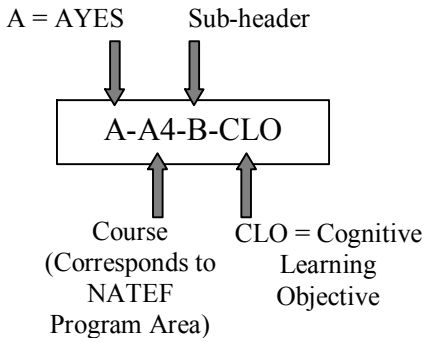
Recommended Grade Level(s): 10th, 11th, or 12th

Number of Competencies in Course: 52 / 88

Note: Course is aligned with NATEF task list for Automotive: Suspension and Steering. Items have been organized based on requirements of Tennessee required course description format.

Suspension and Steering





AUTOMOTIVE: SUSPENSION AND STEERING STANDARDS

1.0 Students will demonstrate leadership, citizenship, and teamwork skills required for success in the school, community, and workplace.

2.0 Students will demonstrate automotive technology safety practices, including Occupational Safety and Health Administration (OSHA) and Environmental Protection Agency (EPA) requirements for an automotive repair facility.

3.0 Students will properly test, diagnose, service, and repair General Suspension and Steering Systems.

4.0 Students will properly test, diagnose, service, and repair Steering Systems.

5.0 Students will properly test, diagnose, service, and repair Suspension Systems**:** Front Suspension/Rear Suspension.

6.0 Students will properly test, diagnose, service, and repair Suspension Systems: Miscellaneous Service.

7.0 Students will properly test, diagnose, service, and repair Wheel Alignment.

8.0 Students will properly test, diagnose, service, and repair Wheel and Tire.

9.0 Students will demonstrate communication skills required in the automotive service industry.

10.0 Students will demonstrate interpersonal and employability skills required in the automotive service industry.

AUTOMOTIVE: SUSPENSION AND STEERING

STANDARD 1.0

Students will demonstrate leadership, citizenship, and teamwork skills required for success in the school, community, and workplace.

LEARNING EXPECTATIONS

The student will:

1.1 Develop a plan for self-improvement.
1.2 Participate in SkillsUSA as an integral part of classroom instruction.
1.3 Assess client expectations.
1.4 Develop a working relationship with a mentor.

PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET

The student:

1.1 Recognizes stress factors.
1.2A Applies the points of the creed to personal and professional situations.
1.2B Reviews professional journals and develops a 3 to 5 minute presentation.
1.3A Develops a customer satisfaction card and implements a plan to gather information from responses.
1.4A Develops a schedule to provide time to work with a mentor.
1.4B Keeps a record of time and activities performed while working with a mentor.

SAMPLE PERFORMANCE TASKS

- Create a leadership inventory and use it to conduct a personal assessment to identify stress factors or sources.
- Participate in various SkillsUSA programs and/or competitive events.
- Measure and modify short-term goals.
- Implement an annual program of work.
- Identify a mentor and establish a relationship with the mentor. Develop a plan using time management skills to spend time with the mentor. Job shadow or internship experiences should be developed and recorded.

INTEGRATION LINKAGES

SkillsUSA, *Professional Development Program,* SkillsUSA, Communications and Writing Skills, Teambuilding Skills, Research, Language Arts, Sociology, Psychology, Math, Technical Math, English IV: Communication for Life, Social Studies, Problem Solving, Interpersonal Skills, Employability Skills, Critical-Thinking Skills, SCANS (Secretary's Commission on Achieving Necessary Skills), Chamber of Commerce, Colleges, Universities, Technology Centers, and Employment Agencies

AUTOMOTIVE: SUSPENSION AND STEERING

STANDARD 2.0

Students will demonstrate automotive technology safety practices, including Occupational Safety and Health Administration (OSHA) and Environmental Protection Agency (EPA) requirements for an automotive repair facility.

LEARNING EXPECTATIONS

Students will:

2.1 Comply with personal and environmental safety practices.
2.2 Use protective clothing and safety equipment used in suspension and steering servicing.
2.3 Use fire protection equipment.
2.4 Follow OSHA and EPA regulations affecting suspension and steering service technology.
2.5 Respond to safety communications referring to suspension and steering issues.
2.6 Passes with 100% accuracy a written examination relating specifically to suspension and steering safety issues.
2.7 Passes with 100% accuracy a performance examination relating specifically to suspension and steering tools and equipment.
2.8 Maintains a portfolio record of written safety examinations and equipment examinations for which the student has passed an operational checkout by the instructor.

PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET

The student:

2.1A Conforms to federal, state, and local regulations when handling, storing, and disposing of chemicals and parts.
2.1B Ensures proper ventilation for chemical use.
2.1C Performs work in a safe, organized manner.
2.2A Demonstrates proper usage of special safety equipment.
2.2B Selects and uses the appropriate protective clothing for a given task.
2.2C Demonstrates the use of eye protection.
2.3A Distinguishes the proper fire extinguisher for each class of fire.
2.3B Demonstrates the proper use of a fire extinguisher.
2.4A Locates regulatory information.
2.4B Extracts information from Material Safety Data Sheets.
2.4C Complies with relevant regulations and standards.
2.5A Interprets safety signs and symbols.
2.5B Complies with safety signs and symbols.
2.6 Passes with 100% accuracy a written examination relating specifically to suspension and steering safety issues.
2.7 Passes with 100% accuracy a performance examination relating specifically to suspension and steering tools and equipment.
2.8 Maintains a portfolio record of written safety examinations and equipment examinations for which the student has passed an operational checkout by the instructor.

SAMPLE PERFORMANCE TASKS

- Assess the work area for safety hazards.
- Design a corrections program for identified hazards.
- Model the appropriate protective equipment for an assigned task.

INTEGRATION LINKAGES

Math, Science, Communication Skills, Teamwork Skills, Reading and Writing Skills, Computer Skills, Internet Navigation Skills, Language Arts, Problem Solving and Critical Thinking Skills, Interpersonal and Employability Skills. Leadership Skills, Secretary's Commission on Achieving Necessary (SCANS), National Institute for Automotive Service Excellence (ASE), National Automotive Technician Education Foundation (NATEF), Occupational Safety and Health Administration (OSHA), Environmental Protection Agency (EPA), AYES Curriculum

AUTOMOTIVE: SUSPENSION AND STEERING

STANDARD 3.0

Students will properly test, diagnose, service, and repair General Suspension and Steering Systems

LEARNING EXPECTATIONS

The student will:

3.1 Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction. P-1

3.2 Identify and interpret suspension and steering concern; determine necessary action. P-1

3.3 Research applicable vehicle and service information, such as suspension and steering system operation, vehicle service history, service precautions, and technical service bulletins. P-1

3.4 Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, calibration decals). P-1

PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET

The student:

3.1 Completes work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction. N-AIV-A-1

3.2 Identifies and interprets suspension and steering concern; determines necessary action. N-AIV-A-2

3.3 Researches applicable vehicle and service information, such as suspension and steering system operation, vehicle service history, service precautions, and technical service bulletins. N-AIV-A-3

3.4 Locates and interprets vehicle and major component identification numbers (VIN, vehicle certification labels, calibration decals). N-AIV-A-4

SAMPLE PERFORMANCE TASKS

- Diagram a steering and suspension system, identifying the forces and principles at work in each point in the system.
- Illustrate the role of hydraulics in a power steering pump.

INTEGRATION LINKAGES

Math, Science, Communication Skills, Teamwork Skills, Reading and Writing Skills, Computer Skills, Internet Navigation Skills, Language Arts, Problem Solving and Critical Thinking Skills, Interpersonal and Employability Skills. Leadership Skills, Secretary's Commission on Achieving Necessary (SCANS), National Institute for Automotive Service Excellence (ASE), National Automotive Technician Education Foundation (NATEF), Occupational Safety and Health Administration (OSHA), Environmental Protection Agency (EPA), AYES Curriculum

AUTOMOTIVE: SUSPENSION AND STEERING

STANDARD 4.0

Students will properly test, diagnose, service, and repair Steering Systems.

LEARNING EXPECTATIONS

The student will:

4.1 Disable and enable supplemental restraint system (SRS). P-1

4.2 Remove and replace steering wheel; center/time supplemental restraint system (SRS) coil (clock spring). P-1

4.3 Diagnose steering column noises, looseness, and binding concerns (including tilt mechanisms); determine necessary action. P-2

4.4 Diagnose power steering gear (non-rack and pinion) binding, uneven turning effort, looseness, hard steering, and fluid leakage concerns; determine necessary action. P-3

4.5 Diagnose power steering gear (rack and pinion) binding, uneven turning effort, looseness, hard steering, and fluid leakage concerns; determine necessary action. P-3

4.6 Inspect steering shaft universal-joint(s), flexible coupling(s), collapsible column, lock cylinder mechanism, and steering wheel; perform necessary action. P-2

4.7 Adjust manual or power non-rack and pinion worm bearing preload and sector lash. P-3

4.8 Remove and replace manual or power rack and pinion steering gear; inspect mounting bushings and brackets. P-1

4.9 Inspect and replace manual or power rack and pinion steering gear inner tie rod ends (sockets) and bellows boots. P-1

4.10 Determine proper power steering fluid type; inspect fluid level and condition. P-1

4.11 Flush, fill, and bleed power steering system. P-2

4.12 Diagnose power steering fluid leakage; determine necessary action. P-2

4.13 Remove, inspect, replace, and adjust power steering pump belt. P-1

4.14 Remove and reinstall power steering pump. P-3

4.15 Remove and reinstall power steering pump pulley; check pulley and belt alignment. P-3

4.16 Inspect and replace power steering hoses and fittings. P-2

4.17 Inspect and replace pitman arm, relay (centerlink/intermediate) rod, idler arm and mountings, and steering linkage damper. P-2

4.18 Inspect, replace, and adjust tie rod ends (sockets), tie rod sleeves, and clamps. P-1

4.19 Test and diagnose components of electronically controlled steering systems using a scan tool; determine necessary action. P-3

4.20 Inspect and test non-hydraulic electric power assist steering. P-3

4.21 Identify hybrid vehicle power steering system electrical circuits, service, and safety precautions. P-3

PERFORMANCE STANDARDS EVIDENCE STANDARDS IS MET

The student:

4.1 Disables and enables supplemental restraint system (SRS). N-AIV-B-1
4.2 Removes and replaces steering wheel; center/time supplemental restraint system (SRS) coil (clock spring). N-AIV-B-2
4.3 Diagnoses steering column noises, looseness, and binding concerns (including tilt mechanisms); determines necessary action. N-AIV-B-3
4.4 Diagnoses power steering gear (non-rack and pinion) binding, uneven turning effort, looseness, hard steering, and fluid leakage concerns; determines necessary action. N-AIV-B-4
4.5 Diagnoses power steering gear (rack and pinion) binding, uneven turning effort, looseness, hard steering, and fluid leakage concerns; determines necessary action. N-AIV-B-5
4.6 Inspects steering shaft universal-joint(s), flexible coupling(s), collapsible column, lock cylinder mechanism, and steering wheel; performs necessary action. N-AIV-B-6
4.7 Adjusts manual or power non-rack and pinion worm bearing preload and sector lash. N-AIV-B-7
4.8 Removes and replaces manual or power rack and pinion steering gear; inspects mounting bushings and brackets. N-AIV-B-8
4.9 Inspects and replaces manual or power rack and pinion steering gear inner tie rod ends (sockets) and bellows boots. N-AIV-B-9
4.10 Determines proper power steering fluid type; inspects fluid level and condition. N-AIV-B-10
4.11 Flushes, fills, and bleeds power steering system. N-AIV-B-11
4.12 Diagnoses power steering fluid leakage; determines necessary action. N-AIV-B-12
4.13 Removes, inspects, replaces, and adjusts power steering pump belt. N-AIV-B-13
4.14 Removes and reinstalls power steering pump. N-AIV-B-14
4.15 Removes and reinstalls power steering pump pulley; check pulley and belt alignment. N-AIV-B-15
4.16 Inspects and replaces power steering hoses and fittings. N-SIB-B-16
4.17 Inspects and replaces pitman arm, relay (centerlink/intermediate) rod, idler arm and mountings, and steering linkage damper. N-SIV-B-17
4.18 Inspects, replaces, and adjusts tie rod ends (sockets), tie rod sleeves, and clamps. N-AIV-B-18
4.19 Tests and diagnoses components of electronically controlled steering systems using a scan tool; determines necessary action. N-AIV-B-19
4.20 Inspects and tests non-hydraulic electric power assist steering. N-AIV-B-20
4.21 Identifies hybrid vehicle power steering system electrical circuits, service, and safety precautions. N-AIV-B-21

SAMPLE PERFORMANCE TASKS

- Remove and replace tie rod ends.
- Remove and replace power steering pump belt.
- Using case scenarios, follow strategy-based diagnostic procedure to verify the complaint, define the problem, isolate the problem, validate the problem, make the repair, and test the repair. Complete a repair order using technical writing skills and calculate salary earnings based on the repair order description and manufacture allowances for each item on the work order. Calculate manufacturer labor operation time used in the diagnostic process.

INTEGRATION LINKAGES

Math, Science, Communication Skills, Teamwork Skills, Reading and Writing Skills, Computer Skills, Internet Navigation Skills, Language Arts, Problem Solving and Critical Thinking Skills, Interpersonal and Employability Skills. Leadership Skills, Secretary's Commission on Achieving Necessary (SCANS), National Institute for Automotive Service Excellence (ASE), National Automotive Technician Education Foundation (NATEF), Occupational Safety and Health Administration (OSHA), Environmental Protection Agency (EPA), AYES Curriculum

AUTOMOTIVE: SUSPENSION AND STEERING

STANDARD 5.0

Students will properly test, diagnose, service, and repair Suspension Systems**:** Front Suspension/Rear Suspension.

LEARNING EXPECTATIONS

The student will:

5.1 Diagnose short and long arm suspension system noises, body sway, and uneven riding height concerns; determine necessary action. P-1

5.2 Diagnose strut suspension system noises, body sway, and uneven riding height concerns; determine necessary action. P-1

5.3 Remove, inspect, and install upper and lower control arms, bushings, shafts, and rebound bumpers. P-3

5.4 Remove, inspect and install strut rods (compression/tension) and bushings. P-2

5.5 Remove, inspect, and install upper and/or lower ball joints. P-1

5.6 Remove, inspect, and install steering knuckle assemblies. P-2

5.7 Remove, inspect, and install short and long arm suspension system coil springs and spring insulators. P-3

5.8 Remove, inspect, install, and adjust suspension system torsion bars; inspect mounts. P-3

5.9 Remove, inspect, and install stabilizer bar bushings, brackets, and links. P-2

5.10 Remove, inspect, and install strut cartridge or assembly, strut coil spring, and insulators (silencers), and upper strut bearing mount. P-1

5.11 Lubricate suspension and steering systems. P-2

5.12 Remove, inspect, and install coil springs and spring insulators. P-2

5.13 Remove, inspect, and install transverse links, control arms, bushings, and mounts. P-2

5.14 Remove, inspect, and install leaf springs, leaf spring insulators (silencers), shackles, brackets, bushings, and mounts. P-3

5.15 Remove, inspect, and install strut cartridge or assembly, strut coil spring, and insulators (silencers). P-2

PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET

The student:

5.1 Diagnoses short and long arm suspension system noises, body sway, and uneven riding height concerns; determines necessary action. N-AIV-C-1-1

5.2 Diagnoses strut suspension system noises, body sway, and uneven riding height concerns; determines necessary action. N-AIV-C-1-2

5.3 Removes, inspects, and installs upper and lower control arms, bushings, shafts, and rebound bumpers. N-AIV-C-1-3

5.4 Removes, inspects and installs strut rods (compression/tension) and bushings. N-AIV-C-1-4

5.5 Removes, inspects, and installs upper and/or lower ball joints. N-AIV-C-1-5
5.6 Removes, inspects, and installs steering knuckle assemblies. N-AIV-C-1-6
5.7 Removes, inspects, and installs short and long arm suspension system coil springs and spring insulators. N-AIV-C-1-7
5.8 Removes, inspects, installs, and adjusts suspension system torsion bars; inspect mounts. N-AIV-C-1-8
5.9 Removes, inspects, and installs stabilizer bar bushings, brackets, and links. N-AIV-C-1-9
5.10 Removes, inspects, and installs strut cartridge or assembly, strut coil spring, and insulators (silencers), and upper strut bearing mount N-AIV-C-1-10
5.11 Lubricates suspension and steering systems. N-AIV-C-11
5.12 Removes, inspects, and installs coil springs and spring insulators. N-AIV-C-2-1
5.13 Removes, inspects, and installs transverse links, control arms, bushings, and mounts. N-AIV-C-2-2
5.14 Removes, inspects, and installs leaf springs, leaf spring insulators (silencers), shackles, brackets, bushings, and mounts. N-AIV-C-2-3
5.15 Removes, inspects, and installs strut cartridge or assembly, strut coil spring, and insulators (silencers). N-AIV-C-2-4

SAMPLE PERFORMANCE TASKS

- Remove a control arm and install bushings.
- Remove a MacPherson strut and replace.
- Using case scenarios follow strategy based diagnostic procedure to verify the complaint, define the problem, isolate the problem, validate the problem, make the repair, and test the repair. Complete a repair order using technical writing skills and calculate salary earnings based on the repair order description and manufacture allowances for each item on the work order. Calculate manufacturer labor operation time used in the diagnostic process.
- Diagnose vehicle wander, drift, pull, hard steering, bump steering, memory steer, torque steer, and steering return concerns; determine the problems and make necessary corrections.

INTEGRATION LINKAGES

Math, Science, Communication Skills, Teamwork Skills, Reading and Writing Skills, Computer Skills, Internet Navigation Skills, Language Arts, Problem Solving and Critical Thinking Skills, Interpersonal and Employability Skills. Leadership Skills, Secretary's Commission on Achieving Necessary (SCANS), National Institute for Automotive Service Excellence (ASE), National Automotive Technician Education Foundation (NATEF), Occupational Safety and Health Administration (OSHA), Environmental Protection Agency (EPA), AYES Curriculum

AUTOMOTIVE: SUSPENSION AND STEERING

STANDARD 6.0

Students will properly test, diagnose, service, and repair Suspension Systems: Miscellaneous Service.

LEARNING EXPECTATIONS

The student will:

6.1 Inspect, remove, and replace shock absorbers. P-1

6.2 Remove, inspect, and service or replace front and rear wheel bearings. P-1

6.3 Test and diagnose components of electronically controlled suspension systems using a scan tool; determine necessary action. P-3

PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET

The student will:

6.1 Inspects, removes, and replaces shock absorbers. N-AIV-C-3-1

6.2 Removes, inspects, and services or replaces front and rear wheel bearings. N-AIV-C-3-2

6.3 Tests and diagnoses components of electronically controlled suspension systems using a scan tool; determines necessary action.N-AIV-C-3-3

SAMPLE PERFORMANCE TASKS

- Remove and replace rear shock absorbers.
- Replace rear wheel bearings.

INTEGRATION LINKAGES

Math, Science, Communication Skills, Teamwork Skills, Reading and Writing Skills, Computer Skills, Internet Navigation Skills, Language Arts, Problem Solving and Critical Thinking Skills, Interpersonal and Employability Skills. Leadership Skills, Secretary's Commission on Achieving Necessary (SCANS), National Institute for Automotive Service Excellence (ASE), National Automotive Technician Education Foundation (NATEF), Occupational Safety and Health Administration (OSHA), Environmental Protection Agency (EPA), AYES Curriculum

AUTOMOTIVE: SUSPENSION AND STEERING

STANDARD 7.0

Students will properly test, diagnose, service, and repair Wheel Alignment

LEARNING EXPECTATIONS

The student will:

7.1 Diagnose vehicle wander, drift, pull, hard steering, bump steer, memory steer, torque steer, and steering return concerns; determine necessary action. P-1
7.2 Perform prealignment inspection; perform necessary action. P-1
7.3 Measure vehicle riding height; determine necessary action. P-1
7.4 Check and adjust front and rear wheel camber; perform necessary action. P-1
7.5 Check and adjust caster; perform necessary action. P-1
7.6 Check and adjust front wheel toe; adjust as needed.P-1
7.7 Check toe-out-on-turns (turning radius); determine necessary action. P-2
7.8 Check SAI (steering axis inclination) and included angle; determine necessary action. P-2
7.9 Check and adjust rear wheel toe. P-1
7.10 Check rear wheel thrust angle; determine necessary action. P-1
7.11 Check for front wheel setback; determine necessary action. P-2
7.12 Check front cradle (subframe) alignment; determine necessary action. P-3

PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET

The student:

7.1 Diagnoses vehicle wander, drift, pull, hard steering, bump steer, memory steer, torque steer, and steering return concerns; determines necessary action. N-AIV-D-1
7.2 Performs prealignment inspection; performs necessary action. N-AIV-D-2
7.3 Measures vehicle riding height; determines necessary action. N-AIV-D-3
7.4 Checks and adjusts front and rear wheel camber; performs necessary action. N-AIV-D-4
7.5 Checks and adjusts caster; performs necessary action. N-AIV-D-5
7.6 Checks and adjusts front wheel toe; adjusts as needed. N-AIV-D-6
7.7 Checks toe-out-on-turns (turning radius); determines necessary action. N-AIV-D-7
7.8 Checks SAI (steering axis inclination) and included angle; determines necessary action. N-AIV-D-8
7.9 Checks and adjusts rear wheel toe. N-AIV-D-9
7.10 Checks rear wheel thrust angle; determines necessary action. N-AIV-D-10
7.11 Checks for front wheel setback; determines necessary action. N-AIV-D-11
7.12 Checks front cradle (subframe) alignment; determines necessary action. N-AIV-D-12

SAMPLE PERFORMANCE TASKS

- Adjust vehicle ride height.
- Check and adjust front wheel toe.
- Check tire air pressure and adjust as needed.

INTEGRATION LINKAGES

Math, Science, Communication Skills, Teamwork Skills, Reading and Writing Skills, Computer Skills, Internet Navigation Skills, Language Arts, Problem Solving and Critical Thinking Skills, Interpersonal and Employability Skills. Leadership Skills, Secretary's Commission on Achieving Necessary (SCANS), National Institute for Automotive Service Excellence (ASE), National Automotive Technician Education Foundation (NATEF), Occupational Safety and Health Administration (OSHA), Environmental Protection Agency (EPA), AYES Curriculum

AUTOMOTIVE: SUSPENSION AND STEERING

STANDARD 8.0

Students will properly test, diagnose, service, and repair Wheel and Tire.

LEARNING EXPECTATIONS

The student will:

8.1 Diagnose tire wear patterns; determine necessary action. P-1
8.2 Inspect tires; check and adjust air pressure. P-1
8.3 Diagnose wheel/tire vibration, shimmy, and noise; determine necessary action. P-2
8.4 Rotate tires according to manufacturer's recommendations. P-1
8.5 Measure wheel, tire, axle, and hub runout; determine necessary action. P-2
8.6 Diagnose tire pull (lead) problem; determine necessary action. P-2
8.7 Balance wheel and tire assembly (static and dynamic). P-1
8.8 Dismount, inspect, repair, and remount tire on wheel. P-2
8.9 Dismount, inspect, repair, and remount tire on wheel equipped with tire pressure sensor. P-3
8.10 Reinstall wheel; torque lug nuts. P-1
8.11 Inspect tire and wheel assembly for air loss; perform necessary action. P-1
8.12 Repair tire using internal patch. P-1
8.13 Inspect, diagnose, and calibrate tire pressure monitoring system. P-3

PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET

The student:

8.1 Diagnoses tire wear patterns; determines necessary action. N-AIV-E-1
8.2 Inspects tires; checks and adjusts air pressure. N-AIV-E-2
8.3 Diagnoses wheel/tire vibration, shimmy, and noise; determines necessary action. N-AIV-E-3
8.4 Rotates tires according to manufacturer's recommendations. N-AIV-E-4
8.5 Measures wheel, tire, axle, and hub runout; determines necessary action. N-AIV-E-5
8.6 Diagnoses tire pull (lead) problem; determines necessary action. N-AIV-E-6
8.7 Balances wheel and tire assembly (static and dynamic). N-AIV-E-7
8.8 Dismounts, inspects, repairs, and remounts tire on wheel. N-AIV-E-8
8.9 Dismounts, inspects, repairs, and remounts tire on wheel equipped with tire pressure sensor. N-AIV-E-9
8.10 Reinstalls wheel; torque lug nuts. N-AIV-E-10
8.11 Inspects tire and wheel assembly for air loss; performs necessary action. N-AIV-E-11
8.12 Repairs tire using internal patch. N-AIV-E-12
8.13 Inspects, diagnoses, and calibrates tire pressure monitoring system. N-AIV-E-13

SAMPLE PERFORMANCE TASKS

- Use a dial indicator to measure runout of wheel assembly.
- Perform a tire rotation on vehicle with directional tires.
- Look up torque specification for different vehicles.
- Draw a diagram of three tire wire patterns.

INTEGRATION LINKAGES

Math, Science, Communication Skills, Teamwork Skills, Reading and Writing Skills, Computer Skills, Internet Navigation Skills, Language Arts, Problem Solving and Critical Thinking Skills, Interpersonal and Employability Skills. Leadership Skills, Secretary's Commission on Achieving Necessary (SCANS), National Institute for Automotive Service Excellence (ASE), National Automotive Technician Education Foundation (NATEF), Occupational Safety and Health Administration (OSHA), Environmental Protection Agency (EPA), AYES Curriculum

AUTOMOTIVE: SUSPENSION AND STEERING

STANDARD 9.0

Students will demonstrate communication skills required in the automotive service industry.

LEARNING EXPECTATIONS

The student will:

9.1 Communicate and comprehend oral and written information typically occurring in automotive suspension and steering diagnosis and repair.
9.2 Solve suspension and steering problems and make decisions using a logical process.
9.3 Use teamwork skills to accomplish goals, solve problems, and manage conflict within groups.

PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET

The student:

9.1A Interprets and uses written information in common job formats, such as tables, charts, and reference materials and manuals pertaining to suspension and steering systems.
9.1B Interprets and uses graphical information such as blueprints, electrical schematics, process control schematics, automotive flow charts, and other automotive diagrams related to suspension and steering.
9.1C Uses electronic resources to obtain service and other automotive information.
9.1D Analyzes information obtained from various sources to determine a diagnostic approach.
9.1E Communicates clearly and appropriately in oral and written form.
9.1F Interprets an automotive repair order.
9.2A Develops a hypothesis regarding the cause of a suspension and steering problem.
9.2B Tests the hypothesis to determine the solution to the suspension and steering problem.
9.2C Creates, evaluates, and revises as needed a plan to resolve a problem.
9.2D Completes strategy based diagnostic procedure to verify the complaint, define the problem, isolate the problem, validate the problem, make the repair, and test the repair pertaining to suspension and steering systems.
9.3A Serves in each of the functional roles of a team performing suspension and steering services.
9.3B Contrasts ethical and unethical workplace behaviors.
9.3C Demonstrates appropriate and positive examples of giving and accepting criticism.
9.3D Modifies behavior or revises work based on appropriate criticism.
9.3E Manages a team and evaluates others.
9.3F Evaluates the role of the repair team within the organizational system of a dealership or fleet shop.

SAMPLE PERFORMANCE TASKS

- Complete an automotive repair order.
- Use reference materials to determine procedures for diagnosing and testing suspension and steering systems.
- Work as a team member to develop a diagnostic strategy.
- Use blueprints and diagrams to execute a task.

INTEGRATION LINKAGES

Math, Science, Communication Skills, Teamwork Skills, Reading and Writing Skills, Computer Skills, Internet Navigation Skills, Language Arts, Problem Solving and Critical Thinking Skills, Interpersonal and Employability Skills. Leadership Skills, Secretary's Commission on Achieving Necessary (SCANS), National Institute for Automotive Service Excellence (ASE), National Automotive Technician Education Foundation (NATEF), Occupational Safety and Health Administration (OSHA), Environmental Protection Agency (EPA), AYES Curriculum

AUTOMOTIVE: SUSPENSION AND STEERING

STANDARD 10.0

Students will demonstrate interpersonal and employability skills required in the automotive services industry.

LEARNING EXPECTATIONS

The student will:

10.1 Infer relationships between work ethics and organizational and personal job success.
10.2 Develops customer service skills.
10.3 Maintain a neat and orderly work area.
10.4 Assess implications of diversity for communities and workplaces.
10.5 Explore supervisory and management roles in the dealership or fleetshop.

PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET

The student:

10.1A Assesses the potential impact of an individual's positive work ethic and an individual's negative work ethic on an organizational system.
10.1B Infers the relationship between work ethics and personal job success.
10.2A Maximizes customer service opportunities.
10.2B Demonstrates improvement in customer service skills.
10.3A Keeps work area and tools organized and free from clutter.
10.3B Cleans work area and suspension and steering related equipment according to NATEF and EPA standards.
10.3C Deduces the correlation between a clean orderly work environment and successful and efficient job performance.
10.4A Points out benefits and problems that may arise from diversity in suspension and steering in various manufacturers.
10.4B Engages in a team negotiation activity.
10.5A Determines personal proficiency in employability behavior competencies.
10.5B Demonstrates personal proficiency in management skill competencies.
10.5C Assesses the benefits of incorporating time management principles into work in the automotive service industry.

SAMPLE PERFORMANCE TASKS

- Maintain an orderly work area.
- Lead a problem-solving team.
- Consistently arrive at class on time.
- Participate in an internship in a dealership.
- Resolve an interpersonal conflict in the classroom.
- Manage a project and evaluate yourself as a leader and evaluate other team members.

INTEGRATION LINKAGES

Math, Science, Communication Skills, Teamwork Skills, Reading and Writing Skills, Computer Skills, Internet Navigation Skills, Language Arts, Problem Solving and Critical Thinking Skills, Interpersonal and Employability Skills. Leadership Skills, Secretary's Commission on Achieving Necessary (SCANS), National Institute for Automotive Service Excellence (ASE), National Automotive Technician Education Foundation (NATEF), Occupational Safety and Health Administration (OSHA), Environmental Protection Agency (EPA), AYES Curriculum

AUTOMOTIVE: SUSPENSION AND STEERING

SAMPLING OF AVAILABLE RESOURCES

A4 Automotive Steering and Suspension Course, AYES Curriculum, AYES Corporation, www.ayes.org

A4 Steering and Suspension Systems, CD-ROM, Interactive Computer Based Training, DVP/CDX 1-888-873-2239

Curriculum Integrator, CORD Communications, Waco, Texas 1998

Module 5 Steering and Suspension Systems, Instructional Materials Laboratory(IML), University of Missouri

Today's Technician Automotive Steering and Suspension, 2nd Edition, Knowles, Delmar Publishing

2002 Automobile Task List, National Automotive Technicians Education Foundation (NATEF), www.natef.org